

Remarks

Reconsideration is requested in view of the preceding amendments and the following remarks. Claims 30-50 are pending.

According to the Office action, claims 43-47 and 50 recite features associated with process limitations. Claims 43-45 are amended to clarify that process limitations are not included in these or other claims. No new matter is introduced.

Claims 30-50 stand rejected as allegedly obvious from a combination of Laibowitz et al., U.S. Patent 5,926,360 ("Laibowitz") and Kang, U.S. Patent 5,786,259 ("Kang"). This rejection is traversed. Claim 30 recites an enhanced-surface-area conductive structure that comprises a supporting structure, a conductive layer situated on a surface of the supporting structure, and a layer of ruthenium oxide having at least one pitted surface situated on the conductive layer. No combination of Laibowitz and Kang teaches or suggests such a structure. According to Laibowitz, deposition of metal films on insulator surfaces produces an array of disconnected clusters of metal until the metal thickness is sufficient to connect the clusters into a continuous layer. Col. 3, lines 7-11. As admitted by the Office action, Laibowitz does not teach or suggest that a layer of ruthenium oxide can be deposited to produce an array of disconnected clusters or that a ruthenium oxide layer having a pitted surface can be formed. Kang fails to cure the deficiencies of Laibowitz. According to Kang, ruthenium oxide can be used to form conductive layers, but Kang provides no teaching or suggestion of metal oxide layers having pitted surfaces as recited in claim 30. See, for example, Kang, col. 6, lines 7-10. The only teaching of a ruthenium oxide layer having a pitted surface is found in the subject application and this teaching cannot be used in hindsight as a motivation to combine or modify reference teachings. Accordingly, claim 30 is properly allowable over any combination of Laibowitz and Kang.

Claim 31 recites a capacitor structure that includes a supporting structure and a conductive layer situated on a surface of the supporting structure. A layer of conductive metallic oxide having a pitted surface is situated on the conductive layer, and a layer of dielectric material is disposed conformally on the pitted surface. As noted above, Laibowitz teaches metal layers that include metallic clusters, but neither Laibowitz nor Kang teaches or suggests a conductive metal oxide layer having a pitted surface as recited in claim 31. Therefore, claim 31 and dependent claims 32-36 are properly allowable over any combination of Laibowitz and Kang.

Claim 37 recites a conductive structure that includes a conductive material with islands of conductive metallic oxide disposed thereon. As noted above, Laibowitz teaches metal layers that include metallic clusters, but neither Laibowitz nor Kang teaches or suggests a conductive material with islands of a conductive metal oxide. Therefore, claim 37 and dependent claim 38 are properly allowable over any combination of Laibowitz and Kang.

Claim 39 recites a capacitor structure that includes a layer of conductive material with islands of conductive metallic oxide disposed thereon. A layer of dielectric material is disposed conformally on the islands of conductive metallic oxide, and a portion of a surface of the layer of conductive material is exposed between the islands. As noted above, Laibowitz teaches metallic clusters, and neither Laibowitz nor Kang teach or suggest islands of conductive metallic oxide. Therefore, claim 39 and dependent claims 40-41 are properly allowable over any combination of Laibowitz and Kang.

Claim 42 recites an integrated circuit that comprises a plurality of capacitors. The capacitors include a conductive layer, a layer of conductive metallic oxide having a pitted surface situated on the conductive layer, and a layer of dielectric material disposed conformally on the pitted surface. As noted above, Laibowitz and Kang are silent concerning a layer of a conductive metal oxide having a pitted surface. For example, Laibowitz discloses a metallic layer formed of metallic clusters. Because no combination of Laibowitz and Kang teaches or suggests a conductive metallic oxide layer having a pitted surface, claim 42 is properly allowable.

Claim 43 as amended recites an enhanced-surface-area conductive structure in an integrated circuit. The structure comprises a conductive layer of ruthenium and ruthenium oxide, wherein at least one surface of the conductive layer has a plurality of pits situated at ruthenium phase zones in the conductive layer. Laibowitz does not teach or suggest a conductive layer of ruthenium and ruthenium oxide having a plurality of pits situated at ruthenium phase zones. Instead, Laibowitz teaches metallic layers having metallic clusters. Kang does not cure the deficiencies of Laibowitz as Kang does not teach or suggest any layers having pits. Therefore, claim 43 is properly allowable over any combination of Laibowitz and Kang.

Claim 44 as amended recites a capacitor structure in an integrated circuit. The structure comprises a layer of conductive metallic oxide with a surface having a plurality of pits situated at metallic phase zones in the conductive layer. A layer of dielectric material is disposed

conformally on the pitted surface. No combination of Laibowitz and Kang teaches or suggests such a structure. Laibowitz teaches a metal layer that includes metallic clusters, but does not teach or suggest a metallic oxide layer having a plurality of pits. Kang does not cure the deficiencies of Laibowitz as Kang does not teach or suggest any layers having pits. Therefore, claim 44 is properly allowable.

Claim 45 as amended recites a capacitor structure that comprises a supporting structure and a layer of conductive metallic oxide having a surface that includes a plurality of pits situated at metallic phase zones in the conductive metallic oxide layer. A layer of dielectric material is disposed conformally on the pitted surface. As noted above, neither Laibowitz nor Kang teaches or suggests a conductive metal oxide layer having a plurality of pits situated at metallic zones in the layer. Laibowitz teaches a metallic layer that includes metal clusters, and is silent concerning a conductive metal oxide layer having pits. Kang does not teach or suggest pitted layers, and thus fails to cure the deficiencies of Laibowitz. Therefore, claim 45 and dependent claims 46-50 are properly allowable over any combination of Laibowitz and Kang.

In view of the preceding amendments and remarks, claims 30-50 are in condition for allowance and action to such end is respectfully requested.

Respectfully submitted,

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